

WHAT IS CLAIMED IS:

1. A disk array system comprising:
a disk controller connected to a host system
via a channel path;

5 a maintenance terminal connected to the disk
controller; and

a disk array connected to the disk controller
via a disk channel, said disk array being composed
of a plurality of drive boards each mounting thereon
10 a plurality of disk drives connected to wiring on
the board, and a common board provided with a
plurality of connectors for connecting the wiring
on each of the drive boards to wiring for the disk
channel, the a plurality of drive boards being
15 detachably mounted on the common board via the
plurality of connectors,

wherein said disk controller defines a part of
the drive boards in the disk array as spare boards
and the rest as active boards, manages $(N + 1)$ pieces
20 of the disk drives ($N \geq 2$) mounted on different drive
boards in a group of active drive boards as a logical
group, dispersively allocates a memory area for
storing error correction information generated in
each logical group to the $(N + 1)$ pieces of disk drivers
25 or fixedly allocates the memory area to a specific

disk drive, and controls the writing and reading of data in the disk array,

the disk controller comprising:

means for reorganizing logical groups when failure occurs in any active disk drive in the disk array, after storing the same data as that stored in disk drives on the faulty board on which a faulty drive is mounted into corresponding one of the disk drives on the substitution board selected from among a group of spare drive boards, so that each logical group to which one of disk drives on the faulty board belongs includes a new disk drive on the substitution board in place of the disk drive on the faulty board; and

means for informing said maintenance terminal that the faulty board is replaceable after the reorganization of the logical groups is completed.

2. A disk array system according to Claim 1, wherein said means for reorganizing the logical groups comprises:

means for writing data regenerated based upon data read out from the other plural disk drives that belong to the same logical group as the faulty drive into one of the substitution disk drives on the

substitution board in place of the faulty drive; and
means for sequentially copying data read out
from normal disk drives mounted on the faulty board
into the other of the substitution disk drives on
5 the substitution board.

3. A disk array system according to Claim 1,
wherein

10 said common board is provided with a plurality
of bypass circuits for selectively bypassing each
connector for connecting to the drive board from
wiring for the disk channel; and

15 said disk controller is provided with means for
switching one of the bypass circuits corresponding
to the connector of the faulty board to a bypassed
state after the reorganization of the logical groups
is completed.

4. A disk array system according to Claim 1,
20 wherein said disk controller manages a recovered
board as a spare drive board when the recovered board
is connected to a connector of the faulty board again.

5. A disk array system according to Claim 1,
25 wherein said disk controller has a board management

table for managing each of said drive boards forming the disk array according to a status code that changes in the order of a normal state, an exchange waiting state and a spare state, and said disk controller
5 manages a board in a normal state as the active board and a board in a spare state as the spare board.

6. A disk array system according to Claim 1, wherein:

10 said connectors for connecting with the drive boards are located on the common board in two-dimensional arrangement having coordinate values on the X-axis and the Y-axis, and the plurality of disk drives are arranged on each drive board in
15 a direction of the Z-axis;

each of said logical group is formed by $(N + 1)$ pieces of disk drives having the same X coordinate value, the same Z coordinate value and different Y coordinate value; and

20 said means for reorganizing logical groups selects as the substitution board a drive board having the same Y coordinate value as that of the faulty board from among a group of spare drive boards, and correlates the disk drives on the faulty board
25 and substitution disk drives on the substitution

board according to respective Z coordinate values.

7. A failure recovering control method
executed by a disk controller in a disk array system
5 composed of the disk controller connected to a host
system and a maintenance terminal, and a disk array
connected to the disk controller via a disk channel,
the disk array being composed of a plurality of drive
boards each mounting thereon a plurality of disk
10 drives connected to wiring on the board, and a common
board provided with a plurality of connectors for
connecting the wiring on each of the drive boards
to wiring for the disk channel, the plurality of drive
boards being detachably mounted on the common board
15 via the plurality of connectors,

wherein said disk controller defines a part of
the drive boards in the disk array as spare boards
and the rest as active boards, manages $(N + 1)$ pieces
of disk drives ($N \geq 2$) mounted on different drive
20 boards in a group of active drive boards as a logical
group, dispersively allocates a memory area for
storing error correction information generated in
each logical group to the plurality of disk drives
or fixedly allocates the memory area to a specific
25 disk drive, and controls the writing and reading of

data in the disk array,

the method comprising the steps of:

selecting a substitution board to be used in place of a faulty board on which a faulty drive is mounted from among a group of said spare drive boards when failure occurs in any active disk drive in the disk array;

5 storing the same data as that stored in each disk drive on the faulty board into disk drives on 10 the substitution board selected from among the group of spare drive boards;

15 reorganizing logical groups to each of which a disk drive on the faulty board belongs into new configuration including a new disk drives on the substitution board in place of the disk drive on the faulty board; and

informing the maintenance terminal that the faulty board is replaceable after the logical groups are reorganized.

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8. A failure recovering control method according to Claim 7, wherein the step of storing data into the disk drives on the substitution board is comprised of:

25 a step of writing data regenerated based upon

data read out from the other plural disk drives that belong to the same logical group as the faulty drive into one of substitution disk drives on the substitution board in place of the faulty drive; and

5 a step of sequentially copying data read out from normal disk drives mounted on the faulty board into the other of the substitution disk drives on the substitution board.

10 9. A failure recovering control method according to Claim 7, wherein the common board is provided with a plurality of bypass circuits for selectively bypassing each connector for connecting to the drive board from wiring for the disk channel; 15 and the control method further comprising a step of switching one of the bypass circuits corresponding to a connector of the faulty board to a bypassed state after the reorganization of the logical groups.